ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

9511 WEST HARRISON STREET, DES PLAINS, ILLINOIS 60016

THOMAS V. SKINNER, DIRECTOR

MEMORANDUM

DATE: February 9, 2001

TO: File

FROM: Chris Kallis CK

SUBJECT: R. Lavin & Sons Inc.
NPDES Permit Number IL0002755
Compliance Evaluation Inspection

Attached is a copy of a Compliance Evaluation Inspection Report for R. Lavin & Sons. The inspection was conducted on December 7, 2000. The inspection found that the permittee was in violation of Section C-3 of the Consent Order No:CH-998 signed on March 27, 1997 and Special Condition 12 of the NPDES Permit. During the inspection, it was found that the 002 ditches were over three quarters full and frozen, greatly diminishing a minimal available storage capacity of 125, 000 gallons, as required by the consent order. According to staff, even if the ditches were thawed they could not pump because the storage tank was nearing full capacity. Dennis Caldwell, the Environmental Coordinator for Lavin, emphasized that these problems were liable to continue. The problem is that due to economic conditions in the U.S. smelting industry, production is now down. R Lavin & Sons was themselves were on a four day workweek. This has resulted in a diminished need for processing water. Therefore, the more it rains and snows, the more stored water accumulates that cant be used in process. In the meantime, concentrations of contaminates in the storm water has remained consistent and in some cases actually increased, based on conservative self monitoring that does not routinely include first flush. Despite pollution prevention initiatives, Lavin has been unable to prevent storm water from coming in contact with contaminated materials. The result is more discharges of contaminated water to Waters of the State resulting in increased loadings to Pettibone Creek. The IEPA 2000 Water Quality Report listed this waterway as being impaired. Pettibone Creek is tributary to the Great Lakes Naval Training Center Harbor which has been listed a fully non- supportive, with the inability to be dredged without a Subtitle G Permit. In addition, Lavin's loading to Pettibone Creek, the harbor and Lake Michigan, as a point source, has been magnified since the source of upstream contamination in Pettibone Creek has been cleaned up under a USEPA CERCLA remedial action.

Some self-monitoring deficiencies were also noted during the inspection. Lavin committed to correcting these during the inspection. One major item was the non-inclusion of all sampling data from Outfall 002 on Discharge Monitoring Reports. As a result, the permittee was found to be in violation of Standard Condition 12-d2 of the NPDES Permit. It is recommended that any inspection follow-up contain a request for corrected and resubmitted DMRs.

United States Environmental Protection Agency
Washington, D.C. 20460

Water Compliance Inspection Report

Form Approved.
OMB No. 2040-0057
Approval expires 8-31-98

Section A: National Data System Coding (i.e., PCS)

Transaction Code		NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
1 N	2 5	3 IL0002755 11	12 001207 17	18 C	19 S	20 2

Remarks
21 ... 66

Inspection Work Days	Facility Self-Monitoring Evaluation Rating	B1	QA	Reserved	
67 ___ 69	70 3	71 N	72 N	73 ___ 74	75 ___ 80

Section B: Facility Data

Name and Location of Facility Inspected *(For industrial users discharging to POTW, also include POTW name and NPDES permit number)*

R Lavin + Sons
2028 Sheridan
North Chicago

Entry Time/Date: 12/7 9:00 Am

Permit Effective Date: April 1, 97

Exit Time/Date: 12/7 2:00 pm

Permit Expiration Date: March 31, 02

Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number(s)

George Lennon plant Manager
Dennis Caldwell, Env coor
847/689-6300

Other Facility Data

Name, Address of Responsible Official/Title/Phone and Fax Number

Jonathon Lavin
Executive officer

Contacted ☐ Yes ☐ No

Section C: Areas Evaluated During Inspection *(Check only those areas evaluated)*

✓	Permit	✓	Flow Measurement	✓	Operations & Maintenance	☐	CSO/SSO (Sewer Overflow)
✓	Records/Reports	✓	Self-Monitoring Program	✓	Sludge Handling/Disposal	✓	Pollution Prevention
✓	Facility Site Review	✓	Compliance Schedules	☐	Pretreatment	☐	Multimedia
✓	Effluent/Receiving Waters	✓	Laboratory	✓	Storm Water	☐	Other:

Section D: Summary of Findings/Comments *(Attach additional sheets of narrative and checklists as necessary)*

see attached.

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Phone and Fax Numbers	Date
Chris Kerley [signature]	IEPA/Desplaines 847-294-4045	2/9/01
Signature of Management Q A Reviewer	**Agency/Office/Phone and Fax Numbers**	**Date**

EPA Form 3560-3 (Rev 9-94) Previous editions are obsolete.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

9511 WEST HARRISON STREET, DES PLAINS, ILLINOIS 60016

THOMAS V SKINNER, DIRECTOR

INSPECTION NOTES

FACILITY NAME:	R. Lavin & Sons Inc. North Chicago Refiners & Smelters
NPDES PERMIT NO.	IL0002755
BASIN CODE:	Q
INSPECTION TYPE:	CEI
DATE OF INSPECTION:	December 7, 2000
INSPECTED BY:	Chris Kallis, DWPC-FOS
INTERVIEWED:	Dennis Caldwell, Environmental Coordinator
	Everett Biegalski, Lab Technician

GENERAL INFORMATION

Responsible Officials:

The name of the principal executive officer is Jonathan Lavin, President. His authorized agent is Dennis Caldwell, the Environmental Coordinator, who can be reached at 847/689-4300. Mr. Caldwell is the Class K operator. The plant manager is George Lennon.

Plant Location:

This facility is located at 2028 South Sheridan Road in North Chicago, Lake County, Waukegan Township. The site occupies a 17.5-acre parcel of land. It is in the northwest corner of Section 4, T44, R12E.

Receiving Waters:

All four of the outfalls enter Pettibone Creek via a storm sewer. The main area storm line runs south along Sheridan Road. According to schematics, it appears to start in the vicinity of the Lavin's 21st Street entrance where it receives effluent from Outfall 004. The

002 and 003 discharges appear to enter an eight-inch line, which in turn enters a storm sewer on 22nd Street. This line runs east into the Sheridan Road line that runs south into Pettibone Creek.

In 1983 a report was prepared for this Agency by Northeastern Illinois Planning Commission titled "An Evaluation of Storm Water Pollutant Loads to Lake Michigan from Lake County ". It included supporting documents that showed about 784 acres of drainage are a tributary to Pettibone Creek upstream of the Lavin/ Sheridan Road outfall, much of which is from impermeable areas. At this time there is no documented dry weather flow upstream of Lavin's discharge. The only known source of upstream contamination along Pettibone Creek has been a 6.4-acre tract of land located just west of Lavin.

After effluent from Lavin enters the creek, it crosses Sheridan Road where it enters the Great Lakes Naval Training Center. On the Navy property, both the west branch and the south branch of Pettibone Creek enter the main stream. The west branch appears to start near the base's main gate from a major drainage tile from the west. The south branch starts about two miles downstream in an area near Green Bay Road. Pettibone Creek enters the Great Lakes Naval Training Center Harbor about a quarter of a mile east of the south branch entry into the main stream. Both the inner and outer harbors at Great Lakes Naval Training Center are highly used recreation areas (fishing, boating, etc.) with a bathing beach just to the north.

Two studies conducted by the U.S. Navy have supplied data on the harbor. Two sampling studies (one in 1988 and the other in 1989) show sediments in the inner harbor to have extremely high concentrations of lead, copper and zinc. Using the guidelines for classifications of Great Lakes harbor sediments (USEPA-1977), the inner harbor and parts of the outer harbor were determined to be heavily polluted with copper, zinc and lead. High concentrations of these metals have been confirmed by earlier studies.

In support of this data, the BOW Planning section performed a water quality study on June 6, 1990. It showed both adverse effects to water quality resulting from Lavin's discharge, especially in the sediment. The amounts of zinc, copper and lead in the sediment downstream from Lavin were shown to be highly elevated.

On September 14, 1992, the Remedial Project Management Section of the Bureau of Land did a screening site inspection. The report confirmed the data that was included in a water quality report prepared by BOW. Heavy metal contamination both on and off the site in Pettibone Creek was documented. The documented off site contamination included stream sediments from Pettibone Creek (including Great Lakes Naval Training Center Harbors). The report concluded that since the site is currently involved with the RCRA program, it should be given a low priority for an expanded site inspection. The recommendation added that an expanded site inspection should be expedited if Lavin defaults on a closure/post closure plan or files for bankruptcy.

On April 20, 1992, a pre-application meeting for a proposed boat basin and outer harbor dredging was held at Great Lakes NTC. As a result, more data was submitted. It included some water quality data taken at the inner harbor, the outer harbor near the inner harbor mouth and the actual outer harbor. Analysis results showed that Title 35 Water Quality Limits were exceeded, including the parameters of arsenic, copper, mercury and lead.

In April of 1994, DLPC conducted a CERCLA Expanded Site Inspection that included extensive sediment sampling. The samples showed that the Lavin property was in fact the primary source for copper, lead and zinc in Pettibone Creek sedimentation. The study also showed that Lavin has been an apparent source for beryllium, chromium, iron, manganese and nickel.

In a letter dated October 4, 1993, from Bruce Yurdin to the Navy, it was made clear that the disposal of excavated material from the Great Lakes NTC Harbor must be disposed of in accordance with Subtitle G requirements. According to the year 2000 Illinois Water Quality Report, the harbor is classified as non-supportable for fish consumption, aquatic life and overall use due to the presence of contaminated sediments. The pollutants of concern include elevated levels of copper, lead and zinc. The only point source noted is industrial. It should be noted that the Navy drinking water intake is within a mile of the harbor. Pettibone Creek was not listed as an impaired water on the Illinois' 1998 submittal for the Clean Water Act Section 303(d) List.

Plant Description:

The subject site is engaged in secondary smelting and refining of nonferrous metals (SIC 3341). The facility processes pure copper, zinc, tin and babbitt (which is an alloy composed partially of antimony) and recycles brass, bronze and scrap copper. Process operations consist of recycling and reusing water for direct ingot cooling, smoke spray towers, flue trail dumpers, press heat exchanges, zinc die-cast molds, cupola water jackets and cupola slag granulation.

Under ideal conditions this water is to be re circulated back into the system either directly or through three circular filters that is run in parallel and use anthrafilt and sand for media. Once used in the process, effluent is diverted to a pumping station. From here the wastewater is pumped either back into the process or to the no-discharge wastewater treatment system. The unit has a DAF of 1.4 MGD and a DMF of 2.8 MGD and is designed for total recirculation. The process consists of two 255,000-gallon capacity tanks used for storage, suspended solids settling, cooling and oil skimming and removal. The unit also includes a filter press and filtration unit. Effluent is normally sent to the 001 reservoir for storage and treatment.

The outfall from the reservoir discharges into a storm sewer on the property. This outfall is listed as Outfall 001. The storm sewer discharges into the east detention ditch on the property. Combined with the west detention ditch, the two-ditch system takes in runoff from warehouses one and two and the concentrator building. This is the location of most of the hazardous waste piles and problem accumulation areas, including uncovered slag

piles. The area around the furnace building is also a source of pollutants. Another waste source to the ditches is apparently leachate and groundwater coming from an area that has been filled. The ditches are unlined and have been shown to be heavily contaminated.

The east ditch has the ability to overflow to the storm sewer tributary to Pettibone Creek. This overflow is designated as Outfall 002, which collects runoff from about nine acres. In addition to storm water, waste streams can include any process water from Outfall 001. To limit Outfall 002 discharges, portable pumps have been installed to recirculate the ditch contents back into the process water system. The storm water is normally pumped to a two million-gallon storage tank on the southern portion of the property. This unit was constructed under Permit Number 1990-EN- 0190 for both process and storm water. Process water can be diverted to the storage tank by way of the emergency maintenance connection for process water storage, which is located in the line between the pumping station and the filters.

There are two additional outfalls tributary to the waters of the state. Both outfalls reportedly only receive storm water runoff at this time. Outfall 003 is located on the southeast section of the property, just south of Outfall 002, and collects runoff from 1.8 acres. According to schematics it enters the same manhole as 002 before entry into the storm sewer. This outfall collects runoff from the hazardous waste storage area. Much of the flow runs very close to the 002 ditch and has a furthermost upstream manhole located near the problem leachate area. 004 are located in the northeast section of the property near the parking lot entrance. It separates into two separate entries into the North Chicago storm sewer. Schematics show that this outfall receives runoff from 6.7 acres. This includes the railroad receiving dock.

It should be noted that since the issuance of the NPDES Permit, the 6.4-acre tract of land upstream of Lavin has undergone a remedial action supervised by USEPA. The cleanup consisted of removing the top two feet (24,000 cubic yards) of topsoil from the property. USEPA does intend to further the remedial investigation by sampling the sediment in Pettibone Creek itself.

NPDES Permit Requirements and Permit Review:

This facility was issued an NPDES Permit on April 4, 1997. It was effective on that date and has an expiration date of March 31, 2002. In the permit, Outfall 001 is described as an internal process water overflow, while Outfall 002 is described as storm water and possible emergency overflow from Outfall 001. Both 003 and 004 are listed as storm water. Flow monitoring and daily sampling is required for all four outfalls. Composite samples are required for total suspended solids, iron, cadmium, copper, lead, nickel, zinc and boron. Grab samples will be required for pH and oil & grease. The following conditions should be noted:

There are no effluent limits for Outfalls 002, 003 and 004. Effluent limits (pertaining to Title 35, Part 304, Subpart A) were given for Outfall 001. However, such limits only apply when 001 and 002 are simultaneously discharging.

- Special Condition 2 disallows the discharge of any process water unless the rainfall provisions as described in 40 CFR 421.63 are met. To insure compliance with these provisions, Special Condition 12 was added. The condition prohibits the use of the storm water retention ditches for the storing of process water, requires that the ditch be pumped as low as possible and requires that records of any dredging of the ditches be kept and be submitted on quarterly reports. Compliance with this condition would limit incidences when small intermittent overflows would go unmonitored.

- Special Conditions 3, 4, 9 and 10 refer specifically to sampling requirements for all the outfalls. Outfall 001 must be sampled at 1000-gallon intervals with a minimum of four grab samples. The storm water outfalls must analyze the first reportable discharge of each calendar month that occurs after a dry period of at least 96 hours. A reportable discharge for Outfall 002 would be greater than 15,000 gallons (at least a three-sample aliquot of 5,000 gallons each). For Outfalls 003 and 004, discharges of four hours or longer capable of producing at least three-sample aliquots would be representative. The grab samples must be taken in the first hour or less.

- Special Condition 11 required the development of a storm water pollution prevention plan. The permittee is also required to submit annual self-inspection reports, the first of which is due 14 months after the date of coverage.

- Special Condition 12 requires that the storm water retention ditches not be used to store process water and that they be pumped as low as possible during dry weather periods. It requires that dates of ditch dredging be recorded and that quarterly reports be submitted.

Background Information:

In the late 19th century, the area south of the E.J.E. Railroad, north of 22nd Street, west of Sheridan and east of Pettibone Creek belonged to Lanyon Zinc and Paint Company. Sometime before 1921, the land was subdivided. The Vulcan Louisville Smelting Company, which was a smelting operation, occupied much of the property now owned by Lavin. It property also included the 6.4 acre tract of land which had been the subject of the USEPA cleanup. The land was subdivided into three parcels just before World War II. Fansteel bought up the south end for their plant to manufacture Tantalum. The property to the west remains undeveloped and held by the Northern Trust Bank in Lake Forest. North Chicago Refiners and Smelters bought the remaining property in the early Forties.

An enforcement case was initiated by DWPC in the late eighties. Due to the nature of the storm water runoff the case was referred to DLPC, who determined the facility to be in violation of Subtitle G - Waste Disposal Regulations. A multimedia enforcement case was developed. During litigation, Lavin & Sons applied for two construction permits. On March 7, 1990, a construction permit was issued (permit number 1990- EN-1990) for the

two million gallon storage tank. On May 2, 1990, a permit to construct (1990- EN-0583) was issued for the construction of a no-discharge wastewater treatment system. It also included piping modifications to separate process water from storm water.

On October 12, 1990, a Consent Order between R. Lavin and Sons (a division of North Chicago Refiners and Smelters) and the State of Illinois (IEPA and Attorney General's office) was approved. The requirements included additional monitoring and studies (including biomontoring and a Boron study), the building of storm water retention and interim and NPDES Permit final limits. The order required final compliance by June 4, 1992.

The Consent Order stated that Lavin must cease and desist from violating 35 Ill. Adm. Code 309.102, which refers to the federal statute 40 CFR 421.63. This statute maintains specific rules regarding process wastewater impoundments subject to secondary copper regulations of the nonferrous metals manufacturing point source categories. It requires that there be no discharge of process wastewater pollutants to navigational waters except under the following conditions. An impoundment is to be constructed as to contain precipitation from a 25-year - 24-hour rainfall event as established by the National Climatic Center, a section of the National Oceanic and Atmosphere Administrations. The impoundment "may discharge that volume of water of process wastewater which is equivalent to the volume of precipitation that falls within the impoundment" in excess of such a rainfall event. In the order, this was to be addressed by constructing and operating a 2,000,000-gallon process water storage tank to reduce discharges from 001. This was to be completed no later than (12) twelve months after the date of the order. Additionally, within 30 days after the effective date of the court order, Lavin was to "maximize" retention of all storm water runoff so as to reduce flow from Outfall 002. This was to be accomplished by providing a minimum of 125,000 gallons of storage that has been computed to be equivalent to retaining rain from a 3.5-year rainfall event. Both of these items were partially addressed by the construction of the two million capacity tank under permit 1990 - EN-1990.

The Consent Order also required that the "Defendant shall not cause or allow any discharges from 001 (reservoir outfall) except in conformance with 40 CFR 421". To comply, Lavin had devised a system to separate storm water from process water, as well as installing two 255,000-gallon capacity tanks used for storage and treatment. The treatment would include suspended solids settling, cooling and oil skimming and removal. A filter press, filtration unit, storage tank and reservoir are also included. The unit has a DAF of 1.4 MGD and a DMF of 2.8 MGD and is designed to totally recalculate. These units were constructed as described in permit number 1990-EN-0583.

Written in the order was the commitment of compliance with final limits by June 2, 1992. Final limits were dependant on the construction of a " water treatment plant designed, among other things, to treat groundwater at the site". A permit to construct a storm water storage and treatment system (Permit Number 1990-EN-1837) was issued on December 18, 1990. The units were designed to treat storm water from a rainfall event that produces 15.90 inches in 96 hours. They were to include three additional storage tanks with a

capacity of 9[illegible],000 gallons each, one neutralization tank, a flocculation tank, a one sand filter and sludge processing. This system was never constructed.

On December 20, 1990, a draft renewed NPDES Permit was put on a thirty-day public notice. The permit reflected the consent decree requirements giving effluent limits for Outfalls 001 and 002, and two additional outfalls, 003 and 004. In response, Lavin filed for a permit appeal to the Pollution Control Board. The basis was the fact that Lavin did not believe that monitoring and effluent requirements for storm water runoff are applicable. In the meantime, Lavin & Sons did not meet the final compliance dates. As noted, the technical remedy, which was the building of the treatment system, was never instituted. According to Lavin, the reason was that it was economically unfeasible to comply with the final requirements. The case went under dispute resolution.

On April 22, 1994, the Agency received a letter addressed to Tom McSwiggin from Lavin attorneys (Jenner & Block). The letter included their clients own water quality data and expressed a desire to avoid an appeal to the IPCB. It stated the belief that the Agency should issue a permit employing Best Management Practices rather than numerical limits. The letter added, " If you insist on a permit with numerical limits, Lavin must have a permit that reflects discharge concentrations likely to occur under current operational conditions".

The NPDES Permit is based on a permit application signed by Bennet Lavin on May 30, 1995. At the request of the Agency, Triad Engineering prepared a storm water first flush study dated November 1995. The study concluded that water quality is not affected and process effluent limits are not applicable. In addressing the question of mass loadings to the creek, the study states, "Mass loadings are an impractical basis for regulating R. Lavin & Son's storm water discharge. Because the mass of contaminants is related most directly to the number, length and intensity of storm events, R. Lavin & Sons could not feasibly control its discharges on a mass basis". As a result, no effluent limits were added to the reissued NPDES Permit. An amended consent order (Lake County Circuit Court, No.90 -CH-998) reflecting the new draft NPDES requirements and objectives was entered on March 27, 1997.

Section C-3 of the Amended Consent Order specifically states, "Defendant shall maintain, at a minimum, that storage capacity for storm water retention and process water which is currently at the site and the capacity in the retention systems called for under VIII. D. 9.a. of the October 12, 1990 Consent Order". In this section it specifically states" defendant shall provide a minimum of 125,000 gallons of storage (which is equivalent to retaining rain from a 3.5 year rainfall event) in the ditches (the sources of discharge for Outfall 002 storm water runoff)".

On December 1998, Lavin discharged approximately 10,000 gallons of process water from Outfall 004 due to a major power failure, which resulted in a process water pump outage. As a follow-up to this event, and an earlier complaint from the U.S. Navy concerning unauthorized discharges, a Violation Notice was sent to Lavin & Sons on January 12, 1999. The notice included violations of the consent order due to the storm water ditches being full resulting in inadequate storage capacity as described in the

consent order. Based on Lavin's responses dated February 26, 1999 and March 30, 1999, a Compliance Commitment Acceptance Letter was sent to Lavin on April 16, 1999. It included a compliance schedule that required the construction of a concrete berm around the area where the concrete slag is stored and the installation of a backup generator in the furnace building. In addition, Lavin was to construct a shelter with an electric heater for the storm water ditch pump. Past inspections have shown that the ditches have been full even in dry weather, a violation of both the consent order and NPDES Permit. Part of the reason, at least in the wintertime, was attributed to a frozen pump or line disallowing diversion of storm water to the storage tank. Subsequent inspections have shown that all the objectives in the compliance schedule have been implemented

NPDES AND CONSENT DECREE COMPLIANCE

Facility Site Review:

On the time of the inspection, the temperature was in the low 20s and overcast. Production was down 33% and the plant was on a four-day workweek. No discharge was occurring from Outfall 002 or 001. However, the eastern ditch (which is receiver of 001 and overflows into outfall 002) and the western ditch appeared about 75% full. Pumping was impossible because they were frozen. When asked why they didn't pump when they received the flow, Mr. Caldwell explained that they are running into capacity problems in the two million gallon storage tank. In fact, on the day of this inspection, the tank reportedly only had a few feet of freeboard. Previously, Lavin has run into this problem when production is heavy due to the over abundance of process related wastewater. Now it is the opposite. Since production is down, there is less of a need for process water. The result is that during heavy rains, there is an accumulation of storm water with nowhere to use it. This is aggravated by the fact that hat the 002 waste stream is the most likely to be contaminated by ongoing process. Much of the slag is in this area, where it is uncovered and in full exposure to rainfall and storm water runoff.

The process water recalculation system was operating satisfactorily. It includes the treatment system consisting of the two 225,000-gallon process storage tanks and sludge processing equipment. According to staff, the unit produces 9000 gallons of sludge a year. Chemical addition includes the addition of flocculate and coagulants. The backup fuel fired 150 KW generator is also now in place. It is stored outside next to the treatment system building. According to George Lennon, it is tested weekly.

As noted, L-shaped berm has been installed around the cupola storage area to prevent runoff into 004. Some quenching was occurring during the inspection. It appeared that all process water was being diverted back in the recirculation system and avoiding discharge to Outfall 004. However, if the process was in operation during a rain event, there is a possibility that some process water can enter the 004 waste stream. There is a cross connection between the process water line and the storm water line. It could not be repaired because it is located under the furnace building that was built in the early

eighties. If there was a power outage and the backup generator were to fail during production, there can still be a likelihood that a discharge of process water could occur from Outfall 004.

Permit Verification:

During the facility site review, the following items were noted:

1. Past observations made by this writer, BOL staff and even Lavin employees, have indicated that the west ditch is almost never dry and is constantly receiving some groundwater infiltration, even in dry weather. Well sampling data has indicated groundwater contamination. Part of this problem may be historical. It is believed that the high water table in conjunction with the contamination is a result of historical management practices. These include evidence of a wetland being filled with slag. Past monitoring by the Bureau of Land has been performed in shallow wells that are six to eight feet in depth. The results have shown heavy contamination to the extent that it has exhibited hazardous waste characteristics and has been termed leachate by DLPC. Maximum concentrations detected included a lead of 20.1 mg/l, a copper of 38.9 mg/l and a zinc of 138 mg/l. It was for this reason that dewatering of the groundwater under the area to be paved was required by the RCRA closure plan.

In the section covering contributing flows, the NPDES permit application states that except in cases of when Outfall 001 is discharging into the 002 ditch, " any discharge from Outfall 002 is composed strictly of storm water to which BMP standards should apply". There is no mention of contaminated ground water in the Outfall 002 description or in the presently issued NPDES permit. However, groundwater has been a small but continuing component to the 002 waste stream and has been fully acknowledged in correspondence from Lavin to both the Agency and North Shore Sanitary District. Best Management Practices cannot address such waste streams since a Storm Water Pollution Prevention Plan can't alleviate them.

2. The sampling and monitoring requirements in the NPDES Permit have been tailored to equipment on hand. However, this has resulted in the possibility of incomplete and erroneous data on discharge monitoring reports. This is supported by Lavin's own first flush study. For instance, sampling in Outfall 004 showed concentrations of zinc during a rainfall event. The composite of all samples showed a concentration of 4.0 mg/l. If the first four hours were taken away, the composite would have shown a concentration of 2.0 mg/l. The variation between the total suspended solids was even more dramatic. Without first flush, it was 6.2 mg/l. With first flush, it was 30 mg/l, a 480% increase.

3. Special Condition 11 is the requirement for a Storm Water Pollution Prevention Plan pertaining to Outfalls 002, 003 and 004. It is based on standard language included in the general storm water NPDES Permit. Not included, is a requirement for a certification of non-storm water discharges. In addition to groundwater infiltration in Outfall 002, there have been inadvertent discharges of process water in the storm water outfalls in the past. Most recently these have occurred in Outfall 004.

4. Data used in the first flush study was used in considering the present NPDES requirements. However, there is evidence that some of the data included was in error or now outdated. For instance, the study states that the non-Lavin upstream loading was significantly higher than Lavin's combined effluent loading. The study stated specifically that the upstream loadings compared to Lavin's effluent was elevated 1800% for zinc, 1900% for copper and 4000% for lead. These results were not based on the concentrations (which were shown to be less than Lavin's). The increased loading was based on estimated upstream flow factors (which conflicts with NIPSI estimates). However, this data also conflicted with the water and sediment data documented by the Navy and this Agency, including the sediment data collected during the CERCLA Expanded Site Inspection. No other significant source of contamination of Pettibone Creek was as apparent. The sediment sampling results indicated that the upstream to downstream concentrations in Pettibone Creek at Lavin's outfall increased 2400% for copper, 3900% for lead and 2760% for zinc. The most dramatic increase was for zinc. The upstream was 614 mg/kg while the downstream concentration was 17000 mg/kg. There were also significant increases in barium, iron, beryllium, manganese, chromium and nickel. The inspection compared Pettibone Creek sediment sample results to the Guidelines for the Protection and Management of Sediment Quality in Ontario. The concentrations found were greater than the "Severe Effect Level, " for copper, lead, manganese, mercury, lead, and zinc.

As noted previously, much of the upstream contamination has been attributed to contamination from a vacant property, which was once part of the Vulcan Louisville Smelting Operations. At this time cleanup activities, under the supervision of USEPA, have been completed. They included the removal of lead contaminated soil. Any NPDES Permit limitations and conditions that have been based on the first flush study may have to be reexamined.

5. The ability to discharge process waters from Outfall 004 was apparently not known when the NPDES Permit application was submitted and therefore not included as a possible waste stream. However, the cross connection between the process water line and the storm sewer does still exist. The possibility of a discharge by way of an emergency overflow has been significantly reduced but does still exist.

Effluent:

Attached is a summary of Discharge Monitoring Reports submitted from December 1999 through November 2000. The reports indicate no NPDES effluent violations since flows from Outfall 001 have been reported to be zero. The data submitted for Outfalls 002, 003 and 004 showed that significant loadings of contaminants have been discharged to Pettibone Creek in the past year. The summary showed that flows from Outfall 002, which are supposed to be minimized, had a 79% increase over the previous year, discharging in eleven out of the 12 months. In these eleven months, the pH exceeded 9.0 during four of them. The increase of average flows have and the overall increase of contaminates in all three outfalls have resulted increased loading to Pettibone Creek. The following is

summary total annual pounds loading to Pettibone Creek in the last twelve reported months. Included are comparisons of to summaries included in previous inspections.

Parameters	1997-1998 Annual lbs	1998-1999 Annual lbs	1999-2000 Annual lbs	Increase from 97-98
Copper	42	99	86	205%
Lead	34	45.50	61	56%
Zinc	281	571	485	58%
TSS	1271	1957	2631	48%
FOG	287	588	524	55%

It should be noted that there were notable increases in cadmium, nickel and boron in the effluents. The loading analysis showed a yearly boron loading of 182 pounds. In addition, the Ph exceeded 9.0 in Outfall 003 in three months of discharge from Outfall 003.

Records and Reports:

It has already been confirmed that Lavin did submit a Storm Water Pollution Prevention Plan and a North Shore Sanitary District Feasibility Study, as required by the Amended Consent Order. Records also indicated that inspection reports have been submitted in accordance with NPDES Permit conditions.

Proper chain of custody procedures are maintained when sampling is conducted. Records indicate that Lavin has kept sampling and analysis data in accordance with NPDES standard conditions. Flow records, lab calibration and other QA records also appear to be in order. A review of Agency records shows that discharge monitoring reports are submitted in a timely manner and that bench sheets correspond with submitted data except for Outfall 002. Apparently, Outfall 002 has been sampled at times more than once a month but only the data from the first sample has been included on the DMR. The problem is that the permittee has been misreading Special Condition 3 which asks for the monitoring of the first reportable discharge from 002, 003 and 004.It was pointed out to Mr. Caldwell that Standard Condition 12d (part 2) states,' if the permittee monitors any pollutant more frequently than required by this permit . . . the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR".

Flow Measurement:

The flow meters appear in good condition. For 001 and 002 flow measurements, Lavin uses Unisonic devices with Inventron recorders. Flow is totaled by meter readings. Strip chart recordings are kept. There appears to be no problem with recording any range of flow whether it is high or low. Lee Engineering Sales, Inc performs calibrations on a

routine basis. Flows for 003 and 004 are estimated by using an area X rainfall coefficient. Baxter & Woodman devised the calculations.

Sampling and Monitoring:

The composite samplers fro all the storm water outfalls have been upgraded and were in excellent condition. All are now placed in heated areas. The 003 sampler is now in the same trailer as the 002 sampler. The 004 sampler is in a warehouse building that Lavin had purchased. The newer samplers are programmed to kick on after the 10, 000 gallons which is in excess of what is required by the NPDES Permit. After that, they sample on a timer, every thirty minutes. Special Condition 3 states that a reportable discharge must be greater than 15,000 gallons for Outfall 002. Even so, there are strong indications that they would be unrepresentative of what is discharged to waters of the State since the monitoring does not include first flush. The result of not is that significant discharges can occur and go unmonitored, making it near impossible to verify compliance with 40 CFR 421.36 and to calculate any type of loading evaluation. Lavin's own study has indicated that an increased amount of contaminants, dependant on rainfall intensity, can be discharged during first flush. In 1996, an estimated 50,000 gallons was discharged from Outfall 002 without any acknowledgment that a discharge was occurring. This was because overflows of about five gpm were occurring continuously.

Unrepresentative sampling is also suspected in Outfalls 003 and 004. Special Condition 3 stated that a reportable discharge for Outfalls 003 and 004 is a discharge of four hours or longer. According to Lavin's first flush study, the first flush duration can range from 0.5 to 9 hours. To their credit, Lavin appears to have made an attempt to at least take grab samples during low discharge events.

Laboratory:

Under the direction of Everett Biegalski, the laboratory procedures comply with NPDES standard conditions and 40 CFR 136.6. All lab equipment, including the ICAP and the standby Atomic Absorption unit, was in good condition. One of the reasons that Boron wasn't included in the March and April 1999 DMRs was a breakdown in the ICAP unit and the failure to gain the proper temperatures in the AA unit to allow analysis for it. The permittee was told that in the future, they must arrange adequate alternative analysis such as a contractor lab. They agreed to do this in the future.

Bench sheets corresponded with submitted data. There is an established QA program. Analysis of known standards is supplied by outside contractors, while duplicate samples are performed 75% of the time. Standards are run on one in eight samples.

Operation and Maintenance:

At the time of the inspection, both the treatment and monitoring equipment was in satisfactory operation. The facility met the requirements of Standard Condition 5 of the NPDES Permit.

Storm Water Evaluation:

Attached is a copy of the Storm Water Pollution Prevention Plan that was revised on May 1, 1998. The following deficiencies were noted:

As noted in the facility site review, uncovered slag piles were significant and still come into contact with rainwater that can runoff into the storm sewer, probably in higher concentrations due to the paved area. The addition of a totally enclosed slag dump area, a shake out pit and slag bin would be the only alternative. In addition to a source of metals loading, uncovered slag piles are also believed to be the source of high pH. This is aggravated by the fact that no attempts have been made to control the pH, either in the manufacturing process or by considering treatment in the ditches.

It has already been noted that the retention ditches have not been dredged and are used for storage. It is also possible that the ditches themselves are a pollution source due to the infiltration of contaminated groundwater. The only serious attempt to prevent such contamination would be to line the ditches, which could probably be done with minimal expense.

The concentrations of boron have on the average exceeded water quality limits in all the storm water outfalls. The boron was noted in the consent order. Instead of a treatment requirement, the order required that a boron study be submitted to the Agency, to coincide with boron monitoring. Lavin used the boron as a fluxing agent. To address the water problem, Lavin had replaced it with a compound derivative from colemite, which is hydrated calcium borate. No provisions are made in the SWPPP as to investigating how this contaminant gets in the storm water.

In the past year, concentrations of oil & grease have fluctuated in all three outfalls, but have been significantly higher in Outfall 003 that should be the least contaminated based on its location. Testing groundwater for related contaminants would confirm or eliminate leachate as a possible source.

SUMMARY

The inspection found that the permittee was in violation of Section C-3 of the Consent Order No:CH-998 signed on March 27, 1997 and Special Condition 12 of the NPDES Permit. During the inspection, it was found that the 002 ditches were over three quarters full and frozen, greatly diminishing a minimal available storage capacity of 125, 000 gallons, as required by the consent order. According to staff, even if the ditches were thawed they could not pump because the storage tank was nearing full capacity. Mr. Caldwell emphasized that these problems were liable to continue. The problem is that due to economic conditions in the U.S. smelting industry, production is now down. R Lavin & Sons was themselves were on a four day workweek. This has resulted in a diminished need for processing water. Therefore, the more it rains and snows, the more stored water

accumulates that cant be used in process. In the meantime, concentrations of contaminates in the storm water has remained consistent and in some cases actually increased, based on conservative self monitoring that does not routinely include first flush. Despite pollution prevention initiatives, Lavin has been unable to prevent storm water from coming in contact with contaminated materials. The result is more discharges of contaminated water to waters of the state resulting in increased loadings to Pettibone Creek. The IEPA 2000 Water Quality Report listed this waterway as being impaired. Pettibone Creek is tributary to the Great Lakes Naval Training Center Harbor which has been listed a fully non- supportive, with the inability to be dredged without a Subtitle G Permit. In addition, Lavin's loading to Pettibone Creek, the harbor and Lake Michigan, as a point source, has been magnified since the source of upstream contamination in Pettibone Creek has been cleaned up under a USEPA CERCLA remedial action.

Some self-monitoring deficiencies were also noted during the inspection. Lavin committed to correcting these during the inspection. One major item was the non-inclusion of all sampling data from Outfall 002 on Discharge Monitoring Reports. As a result, the permittee was found to be in violation of Standard Condition 12-d2 of the NPDES Permit.

Chris Kallis

CK:ck

Attachments

- NPDES Permit Effluent Requirements
- Plant Diagram
- Site Map and Outfall Location
- DMR Summary
- Pettibone Creek Loading Evaluation
- CERCLA Pettibone Creek Sediment Data
- Well Monitoring Data
- SWPPP

DRAFT

DEC 14 1998

PUBLIC NOTICED

NPDES Permit No. IL0002755

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE
1 From the effective date of this permit until the expiration date of this permit, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:						
Outfall(s): 002, 003 and 004 Stormwater						
Flow					When Discharging	Estimate
pH			Monitor	Monitor	See Special Condition 3	Manual Grab Sample
Total Suspended Solids			Monitor	Monitor	See Special Condition 3	Daily Composite*
Iron (Total)			Monitor	Monitor	See Special Condition 3	Daily Composite*
Cadmium (Total)			Monitor	Monitor	See Special Condition 3	Daily Composite*
Copper (Total)			Monitor	Monitor	See Special Condition 3	Daily Composite*
Lead (Total)			Monitor	Monitor	See Special Condition 3	Daily Composite*
Nickel (Total)			Monitor	Monitor	See Special Condition 3	Daily Composite*
Zinc (Total)			Monitor	Monitor	See Special Condition 3	Daily Composite*
Oil & Grease			Monitor	Monitor	See Special Condition 3	Manual Grab Sample
Boron			Monitor	Monitor	See Special Condition 3	Daily Composite*

See Special Condition No. 11

*See Special Condition No. 10

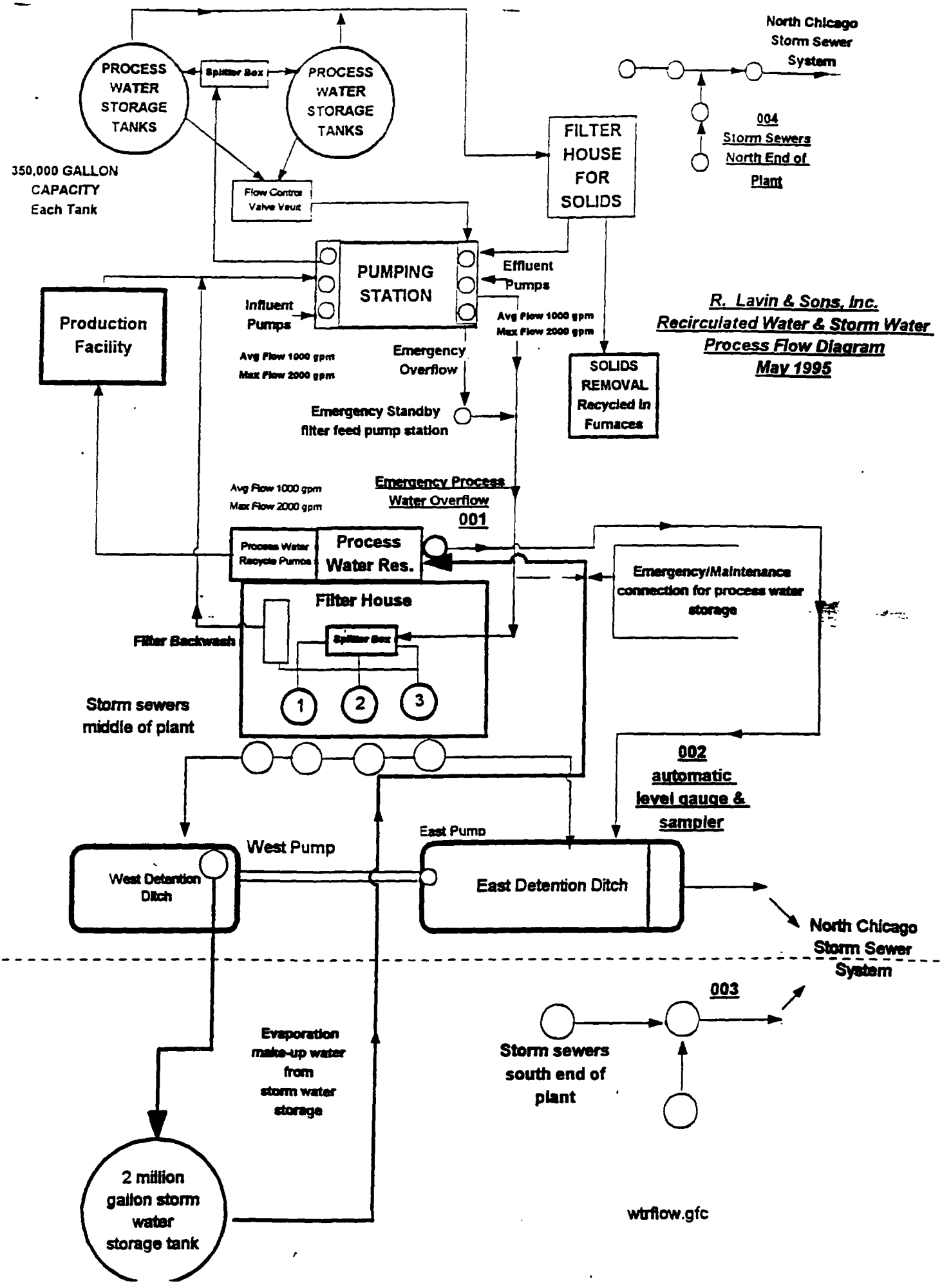
NPDES Permit No IL0002755

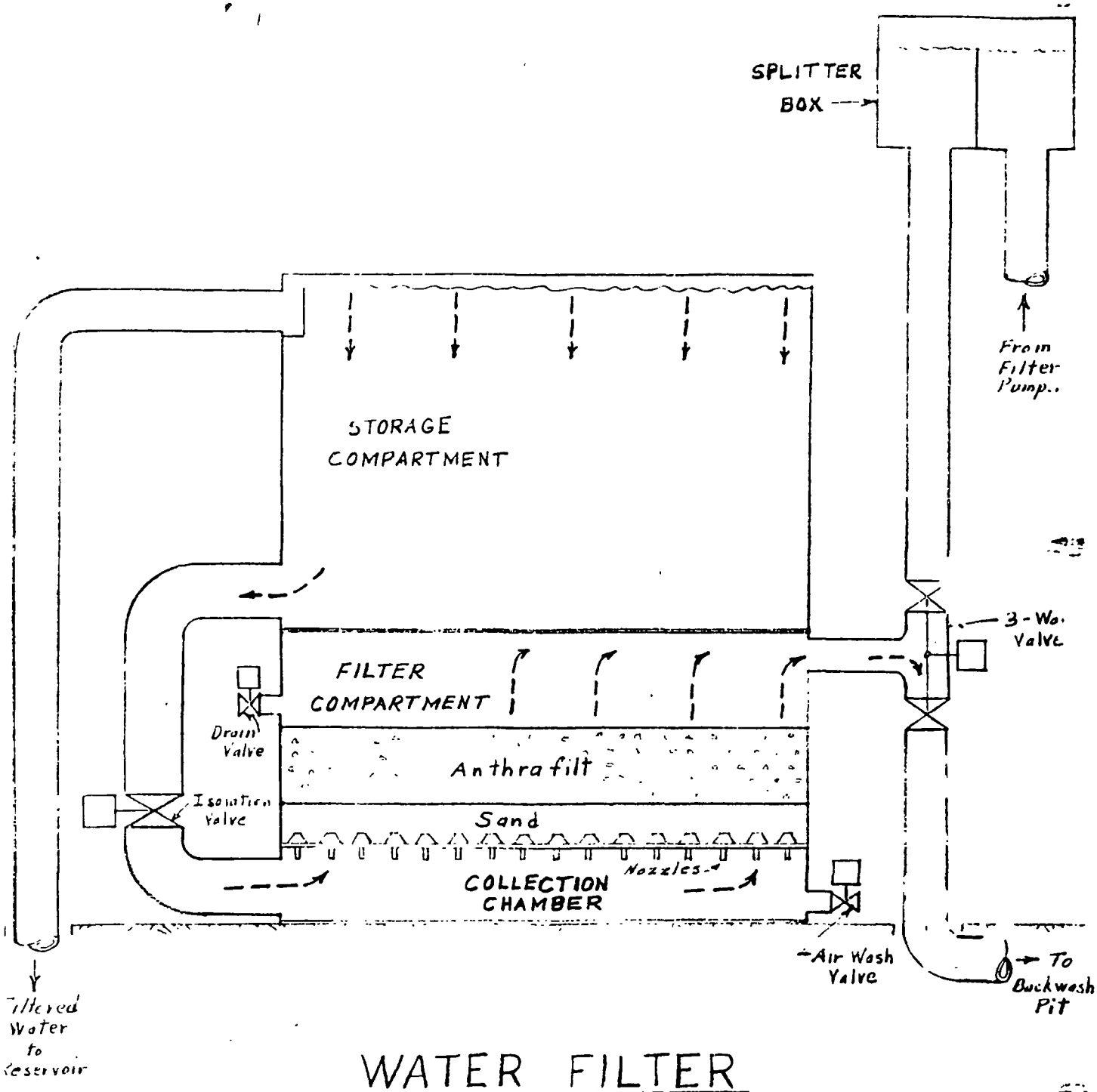
Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX.	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE
1 From the effective date of this permit until the expiration date of this permit, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:						
Outfall(s). 001 Process Water Emergency Overflow (These limitations apply at Outfall 001 only when 001 and 002 are simultaneously discharging)						
Flow					Daily When Discharging	24 Hour Total
pH	See Special Condition No 1				Daily When Discharging	Manual Grab Sample
Total Suspended Solids			15.0	30.0	Daily When Discharging	Daily Composite*
Iron (Total)			2.0	4 0	Daily When Discharging	Daily Composite*
Cadmium (Total)			0.15	0.30	Daily When Discharging	Daily Composite*
Copper (Total)			0.5	1.0	Daily When Discharging	Daily Composite*
Lead (Total)			0.2	0.4	Daily When Discharging	Daily Composite*
Nickel (Total)			1 0	2.0	Daily When Discharging	Daily Composite*
Zinc (Total)			1.0	2.0	Daily When Discharging	Daily Composite*
Oil & Grease			15.0	30.0	Daily When Discharging	Manual Grab Sample
Boron				1.0	Daily When Discharging	Daily Composite*

See Special Condition No. 2

*See Special Condition No. 9.


PROCESS WATER STORAGE TANKS
Splitter Box
PROCESS WATER STORAGE TANKS
350,000 GALLON CAPACITY Each Tank
Flow Control Valve Vaut
FILTER HOUSE FOR SOLIDS
North Chicago Storm Sewer System
004 Storm Sewers North End of Plant
PUMPING STATION
Effluent Pumps
Influent Pumps
Production Facility
Avg Flow 1000 gpm
Max Flow 2000 gpm
Avg Flow 1000 gpm
Max Flow 2000 gpm
Emergency Overflow
SOLIDS REMOVAL Recycled in Furnaces
Emergency Standby filter feed pump station
R. Lavin & Sons, Inc.
Recirculated Water & Storm Water Process Flow Diagram
May 1995
Avg Flow 1000 gpm
Max Flow 2000 gpm
Emergency Process Water Overflow
001
Process Water Recycle Pumps
Process Water Res.
Filter House
Splitter Box
Filter Backwash
1
2
3
Storm sewers middle of plant
Emergency/Maintenance connection for process water storage
002 automatic level gauge & sampler
East Pump
West Pump
West Detention Ditch
East Detention Ditch
North Chicago Storm Sewer System
003
Storm sewers south end of plant
Evaporation make-up water from storm water storage
2 million gallon storm water storage tank
wtrflow.gfc

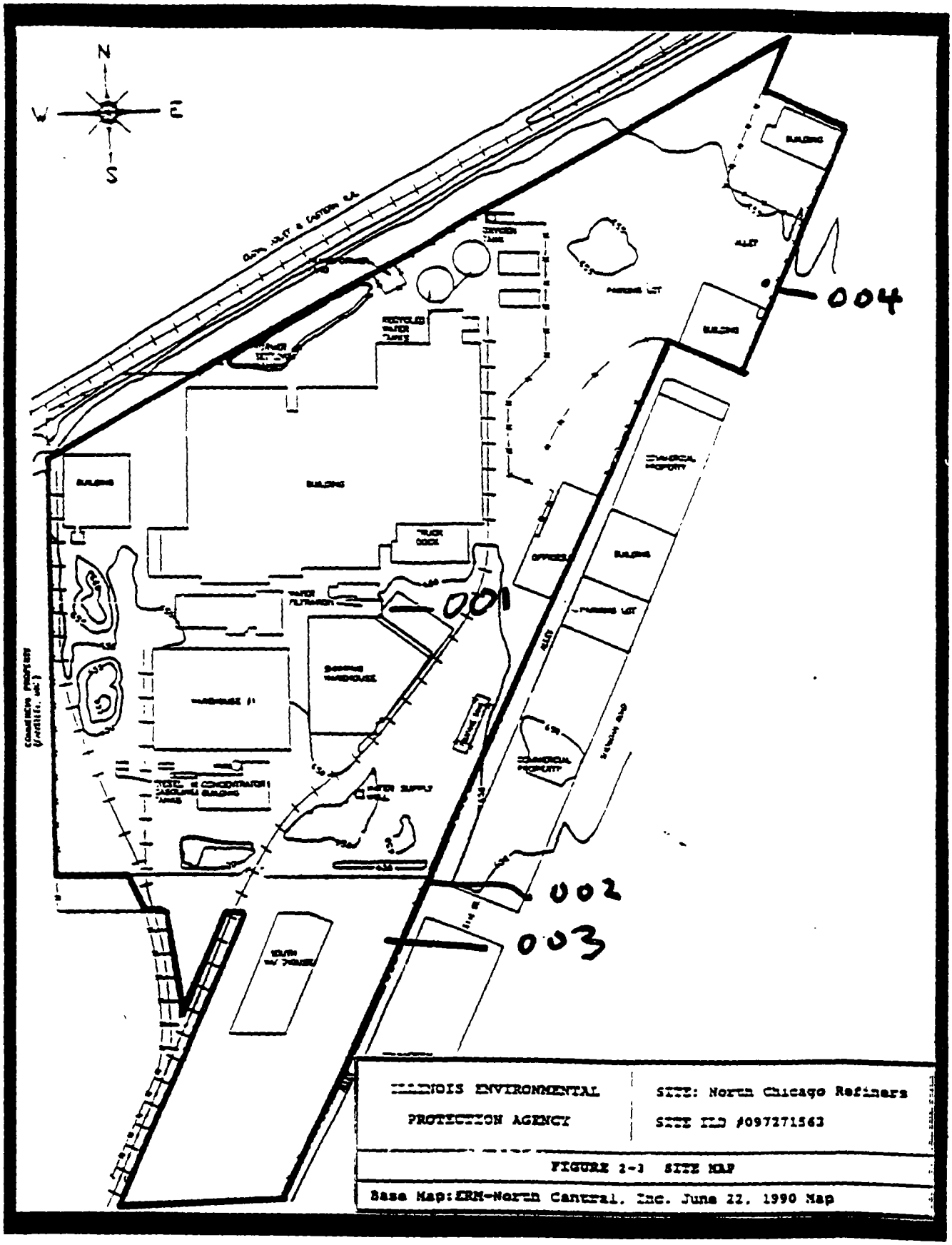


WATER FILTER

FLOW OF BACKWASH CYCLE

Path of Water ----->

D73-1
W. Schmidt
1/3/73


N
W
E
S
004
001
002
003
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
SITE: North Chicago Refiners
SITE ILD #097271563
FIGURE 2-1 SITE MAP
Base Map: ERM-North Central, Inc. June 22, 1990 Map

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

IL 532-0357
ADM 39
054-002

Subject Outfall 002 - Lawn

Data Avg effluent data -

Reviewed by C ICwllis Date 2/9/01

	Flow	pH	TSS	Boron	Cadmium	Copper	Iron	Lead
Dec 99 -	0.012516	6.44	2.00	0.81	0.02	0.23	0.40	0.52
Jan 00 -	0							
Feb -	0.020847	8.56	37.20	3.02	0.06	0.69	0.73	0.54
Mar -	0.001406	7.50	10.0	-	0.02	0.37	0.72	0.28
Apr -	0.050067	7.42	10.40	-	0.03	0.63	0.41	0.40
May -	0.050065	7.49	38.80	2.06	0.01	1.06	1.52	0.55
June -	0.063400	9.43	41.20	2.55	0.01	0.63	0.78	0.24
July -	0.036903	9.30	43.20	1.66	0.01	0.76	1.12	0.34
Aug -	0.062839	9.20	27.60	2.82	0.02	1.30	1.20	1.08
Sept -	0.039400	8.73	48.40	2.29	0.01	1.28	1.19	0.95
Oct -	0.007032	9.29	18.40	1.81	0.01	0.83	0.80	0.69
Nov -	0.004903	8.58	18.40	2.01	0.01	0.72	0.80	0.66
	0.0241	8.3	26.87	2.1	.019	0.77	0.879	0.568

	Nickel	Zinc	Oil + Grease
Dec 99	0.13	2.43	1.80
Jan 00			
Feb	0.01	4.25	0.40
Mar	0.01	3.17	1.70
Apr	0.01	3.21	2.10
May	0.05	4.64	3.90
June	0.04	2.47	1.40
July	0.02	3.10	2.10
Aug	0.12	4.15	6.50
Sept	0.11	3.25	1.60
Oct	0.10	2.53	3.20
Nov	0.12	2.70	25.60
	0.064	3.36	4.57

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

IL 532-0357
ADM 39
054-002

Subject Outfall 003 - Lavin

Data Avg. Effluent data

Reviewed by C Kallis Date 2/9/01

	Flow	pH	TSS	Boron	Cadmium	Copper	Iron
Dec 99 -	0.002180	7.70	16.0	0.43	0.01	0.63	0.92
Jan 00 -	0.000857	7.52	—	—	—	—	—
Feb -	0.001659	7.65	0.10	0.39	0.02	0.18	0.49
Mar -	0.001623	—	—	—	—	—	—
Apr -	0.004353	6.86	0.80		0.01	0.30	0.41
May -	0.005403	7.89	32.00	2.17	0.01	0.65	1.29
June -	0.006064	9.15	54.00	3.12	0.01	0.66	0.64
July -	0.006087	7.34	0.40	0.96	0.01	0.30	0.36
Aug -	0.001114	8.39	20.00	1.84	0.01	0.67	0.64
Sep -	0.006315	7.71	37.60	2.37	0.01	1.15	0.88
Oct -	0.001173	9.84	14.40	1.95	0.01	0.74	0.80
Nov -	—	—	—	—	—	—	—
Avg.	0.0029	8.0	19.48	1.47	0.011	0.587	0.714

	Lead	Nickel	Zinc	Oil + Grease
Dec 99	0.45	0.01	1.35	10.70
Jan 00	—	—	—	0.10
Feb	0.30	0.01	0.83	0.10
Mar	—	—	—	—
Apr	0.40	0.01	2.18	5.00
May	0.26	0.02	2.06	7.30
June	0.23	0.02	2.53	7.60
July	0.08	0.03	0.86	2.90
Aug	0.63	0.10	2.45	9.70
Sept	0.45	0.13	2.17	5.30
Oct	0.87	0.10	2.15	5.60
Nov	—	—	—	—
Avg	0.463	.048	1.84	6.03

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

IL 532-0357
AOM 39
054-002

Subject Outfall 004 - Lavis

Data Avg. DMR Event data

Reviewed by C Keller Date 2/09/01

	Flow	pH	TSS	Boron	Cadmium	Copper	Iron
Dec 99	0.008199	8.43	12.40	0.60	0.13	0.68	0.58
Jan 00	0.002093	8.42	108.60	0.28	0.06	2.31	3.67
Feb	0.006236	7.36	4.00	0.33	0.16	0.62	0.41
Mar	0.006101	7.30	5.20		0.04	0.44	0.47
Apr	0.004353	6.86	0.80		0.01	0.30	0.41
May	0.020307	7.98	6.80	0.74	0.02	0.79	0.28
June	0.022790	7.40	2.00	0.41	0.01	0.51	0.51
July	0.022879	7.27	0.80	0.49	0.01	0.38	0.12
Aug	0.004186	7.22	0.80	0.29	0.02	0.34	0.38
Sept	0.023734	6.80	2.40	0.38	0.02	0.80	0.46
Oct	0.004409	7.10	12.00	0.30	0.02	0.74	0.87
Nov	0.010777						
	0.0113	7.46	14.2	0.424	0.046	0.719	0.742

	Lead	Nickel	Zinc	Oil + Grease
Dec 99	0.54	0.01	10.90	1.30
Jan 00	1.54	0.01	4.82	4.20
Feb	0.42	0.01	20.60	0.80
Mar	0.29	0.01	3.57	4.50
Apr.	0.40	0.01	2.18	5.00
May	0.26	0.03	7.98	4.20
June	0.12	0.02	3.62	3.90
July	0.14	0.06	2.52	1.10
Aug	0.45	0.11	2.47	9.30
Sept	0.59	0.06	4.49	1.70
Oct	0.65	0.12	2.77	8.00
Nov				
	0.447	0.041	6.45	4.0

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

IL 532-0357
ADM 39
054-002

Subject Lavin & Sons

Data loading data

Reviewed by E Kallis Date 02/04/01

TSS loading

002 - 8.7965 × 26.87 × 8.34 = 1,971
003 - 1.0585 × 19.48 × 8.34 = 172
004 - 4.1245 × 14.2 × 8.34 = 488
2631 pounds

Boron loading

002 - 8.7965 × 2.1 × 8.34 = 154
003 - 1.0585 × 1.47 × 8.34 = 13
004 - 4.1245 × 0.424 × 8.34 = 15
182 pounds

Cadmium loading

002 - 8.7965 × 0.019 × 8.34 = 1.39
003 - 1.0585 × 0.011 × 8.34 = 0.097
004 - 4.1245 × 0.046 × 8.34 = 1.58
3.06 pounds

Copper loading

002 - 8.7965 × 0.77 × 8.34 = 56
003 - 1.0585 × 0.587 × 8.34 = 5.18
004 - 4.1245 × 0.719 × 8.34 = 24.7
85.8 pounds

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

IL 532-0357
ADM 39
054-002

Subject Lavin + Sons

Data Loading

Reviewed by C Y-Willis Date 02/09/07

Iron Loading

002- 8.7465 × 0.879 × 8.34 = 64.49
003- 1.0585 × 0.714 × 8.34 = 6.30
004- 4.1245 × 0.742 × 8.34 = 25.52
96 pounds

Lead Loading

002- 8.7465 × 0.568 × 8.34 = 41.67
003- 1.0585 × 0.463 × 8.34 = 4.087
004- 4.1245 × 0.447 × 8.34 = 15.376
61 pounds

Nickel Loadings

002- 8.7465 × 0.064 × 8.34 = 4.645
003- 1.0585 × 0.048 × 8.34 = 0.423
004- 4.1245 × 0.041 × 8.34 = 1.41
6.52 pounds

Zinc Loadings

002- 8.7465 × 3.36 × 8.34 = 246.5
003- 1.0585 × 1.84 × 8.34 = 16.24
004- 4.1245 × 6.45 × 8.34 = 221.87
485 pounds

Oil + Grease

002- 8.7465 × 4.57 × 8.34 = 333
003- 1.0585 × 6.03 × 8.34 = 53
004- 4.1245 × 4.0 × 8.34 = 138
524 pounds

NORTH CHICAGO REFINERS & SMELTERS

ILD097271563

SOIL SAMPLES

CK

SAMPLING POINT	X101 GLNTC 4-27-94	X102 GLNTC 4-27-94	X103 School 4-27-94	X104 Resid 4-27-94	X105 Resid 4-27-94	X106 Resid 4-27-94	X107 Resid 4-27-94	X108 Resid 4-27-94	X109 Resid. 4-27-94	X110 Resid 4-27-94	X111 Resid 4-27-94
VOLATILES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Methylene Chloride	4 00 J	12 00 U	--	--	--	--	7 00 J	--	--	--	--
1 1 1- Trichloroethane	3 00 J	12 00 U	--	--	--	--	6 00 J	--	--	--	4 00 J
SEMIVOLATILES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
2 Methylnaphthalene	390 00 U	390 00 U	--	--	110 00 J	--	--	--	--	--	--
Acenaphthylene	390 00 U	390 00 U	--	--	170 00 J	170 00 J	--	--	--	--	--
2,6 Dinitrotoluene	390 00 U	390 00 U	--	--	--	--	--	--	--	--	--
Phenanthrene	420 00	250 00 J	--	--	--	480 00	510 00	170 00 J	190 00 J	890 00	190 00 J
Anthracene	390 00 U	390 00 U	89 00 J	--	90 00 J	--	--	--	--	150 00 J	--
Carbazole	390 00 U	390 00 U	89 00 J	--	--	--	--	--	--	94 00 J	--
Di-n-Butylphthalate	1100 00	390 00 U	--	400 00	--	830 00	1200 00 B	1500 00	--	830 00	1100 00
Fluoranthene	590 00	610 00	390 00	130 00 J	250 00 J	760 00	630 00	310 00 J	300 00 J	1300 00	380 00 J
Pyrene	520 00	490 00	250 00 J	130 00 J	350 00 J	940 00	710 00	240 00 J	260 00 J	1600 00	340 00 J
Butylbenzylphthalate	390 00 U	390 00 U	--	--	--	--	--	--	--	130 00 J	--
3 3-Dichlorobenzidine	390 00 U	390 00 U	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	400 00	430 00	--	--	--	640 00	480 00	140 00 J	190 00 J	1100 00	220 00 J
Chrysene	470 00	460 00	850 00	500 00	1100 00	810 00	540 00	190 00 J	240 00 J	1200 00	270 00 J
bis(2-Ethylhexyl)phthalate	150 00 J	390 00 U	--	--	--	530 00	570 00	590 00	610 00	--	280 00 J
Di-n-Octylphthalate	390 00 U	390 00 U	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	460 00	390 00 U	--	--	--	--	520 00	--	--	1100 00	230 00 J
Benzo(k)fluoranthene	370 00 J	490 00	820 00	450 00	790 00	800 00	440 00	170 00 J	210 00 J	--	200 00 J
Benzo(a)pyrene	380 00 J	320 00 J	570 00	310 00 J	670 00	620 00	--	--	--	800 00	180 00 J
Indeno(1 2 3 cd)pyrene	200 00 J	390 00 U	-	-	--	--	-	--	--	--	--

NORTH CHICAGO REFINERS & SMELTERS

ILD097271563

SOIL SAMPLES (continued)

SAMPLING POINT	X101 GLNTC 4-27-94	X102 GLNTC 4-27-94	X103 School 4-27-94	X104 Resid 4-27-94	X105 Resid 4-27-94	X106 Resid. 4-27-94	X107 Resid 4-27-94	X108 Resid 4-27-94	X109 Resid. 4-27-94	X110 Resid. 4-27-94	X111 Resid 4-27-94
PESTICIDES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
delta BHC	20 00 U	2 00 U	--	--	--	3 90 P	--	280 00 PD	280 00 PD	--	--
gamma-BHC (Lindane)	20 00 U	2 00 U	--	0 79 JP	0 29 JP	1 40 JP	--	--	--	--	--
Heptachlor	20 00 U	2 00 U	--	--	--	--	--	150 00	150 00	3 30 P	--
Heptachlor epoxide	20 00 U	2 00 U	2 10 P	7 20 P	--	--	--	1000 00 PD	1000 00 PD	5 90 P	--
Dieldrin	20 00 U	0 76 JP	1 90 JP	5 40 P	--	25 00 P	2 90 JP	--	--	--	43 00 PD
4,4 - DDE	2600 00 BC	35 00	--	500 00 D	80 00	65 00 D	31 00	150 00	150 00	32 00	--
Endrin	4 10 JP	4 80 P	10 00 P	22 00 P	28 00 P	88 00 D	39 00	--	--	30 00	160 00 D
Endosulfan II	38 00 U	2 60 J	--	--	11 00 P	--	11 00	--	--	--	--
4,4'-DDD	28 00 JP	4 80 P	1 90 JP	54 00 D	11 00 P	41 00 PD	6 20 P	--	--	7 40 P	7 60 P
Endosulfan sulfate	38 00 U	3 90 U	--	--	--	--	--	20 00 JP	14 00 JP	--	--
4,4 - DDT	590 00 BC	22 00	22 00	430 00 D	89 00	120 00 PD	38 00 P	130 00 P	140 00 P	41 00 P	18 00 P
Methoxychlor (Marlate)	58 00 J	20 00 U	--	--	--	--	--	--	--	--	14 00 JP
Endrin Ketone	38 00 U	3 90 U	--	--	--	--	--	--	--	--	--
Endrin aldehyde	8 70 JP	3 90 U	--	--	--	--	7 70 P	14 00 JP	13 00 JP	--	--
alpha-Chlordane	4 40 JP	0 44 JP	8 60	23 00 P	8 00 P	55 00 D	4 60 P	4100 00 D	4100 00 D	40 00 P	50 00 D
gamma-Chlordane	20 00 U	1 50 JP	4 80 P	9 70 P	6 50 P	20 00 P	4 80 P	2000 00 PD	1900 00 PD	--	48 00 PD
Toxaphene	2000 00 U	200 00 U	--	--	--	--	--	--	--	--	--
Aroclor-1016	380 00 U	39 00 U	--	--	--	650 00 D	--	--	--	--	--
Aroclor-1254	--	--	--	--	--	--	--	--	--	--	2100 00 D
Aroclor-1260	380 00 U	39 00 U	91 00	200 00 P	220 00	640 00 D	260 00	320 00 JP	370 00 JP	230 00	1300 00 D
INORGANICS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	15400 00	13700 00	14900 00	12700 00	16700 00	15500 00	14700 00	16000 00	16800 00	13300 00	16000 00
Antimony	10 20 UJ	10 10 UJ	--	--	--	--	--	--	--	--	--
Arsenic	7 60	9 10	6 20	12 60	11 10	10 60	13 10	10 00	11 40	12 10 J	9 10 J
Barium	72 20	63 00	91 90	136 00	116 00	135 00	129 00	151 00	159 00	103 00	101 00
Beryllium	0 81 B	0 75 B	0 84 B	1 10	1 50	1 00 B	1 10	1 00 B	1 00 B	0 97 B	1 00 B
Cadmium	0 80 U	0 79 U	--	5 50	5 30	3 00	5 70	4 60	3 40	2 61	1 40
Calcium	16100 00	26200 00	18300 00	16300 00	25500 00	11000 00	12100 00	12300 00	12500 00	18100 00	12400 00
Chromium	23 40	21 60	23 00	36 10	34 70	216 00	75 80	45 90	45 00	62 40	33 30
Cobalt	8 10 B	9 00 B	7 20 B	7 40 B	9 50 B	10 60	8 50 B	9 80 B	10 40 B	12 70	9 00 B
Copper	24 40	22 70	60 20	506 00	606 00	200 00	370 00	300 00	287 00	281 00	271 00
Iron	22900 00	21700 00	20100 00	23300 00	25500 00	24400 00	22100 00	21700 00	22800 00	22300 00	22600 00
Lead	47 70	38 70	132 00	1180 00	586 00	297 00	467 00	251 00	233 00	318 00	200 00
Magnesium	10600 00	17500 00	10800 00	8900 00	11400 00	2740 00	6610 00	7240 00	7400 00	10400 00	7070 00
Manganese	700 00	689 00	539 00	404 00	542 00	470 00	553 00	782 00	814 00	709 00	412 00
Mercury	0 05 B	0 06 B	0 15	0 43	0 47	0 58	3 80	0 23	0 26	0 43	0 13
Nickel	23 80	26 70	22 60	34 80	44 60	32 20	30 70	27 70	24 30	31 70	28 60
Potassium	3250 00	2670 00	2630 00	1940 00	2280 00	2680 00	2080 00	2230 00	2150 00	2110 00	2600 00
Selenium	0 23 UJ	0 24 UJ	0 29 BJ	1 50 J	1 60 J	0 50 BJ	2 10 J	0 43 BJ	2 00 J	2 30 J	0 34 BJ
Silver	0 80 U	0 79 U	--	1 00 B	--	2 40	9 80	1 10 B	1 20 B	--	--
Sodium	89 40 B	115 00 B	119 00 B	121 00 B	252 00 B	114 00 B	120 00 B	98 80 B	108 00 B	110 00 B	87 40 B
Thallium	0 23 UJ	0 24 UJ	--	--	--	--	--	--	0 52 B	0 44 B	0 45 B
Vanadium	37 00	32 00	35 10	33 60	35 30	35 40	35 60	36 70	38 70	31 90	36 80
Zinc	91 80	86 30	329 00	2650 00	2690 00	761 00	1740 00	1210 00	1150 00	1100 00	845 00
Cyanide	0 98 U	0 98 U	--	--	1 40	2 10	--	1 40	--	--	--

NORTH CHICAGO REFINERS & SMELTERS
ILD097271563

SEDIMENT SAMPLES

SAMPLING POINT	X201 Trib to Pettibone	X202 Trib. to Pettibone	X203 L Michigan Harbor	X204 Pettibone GLNTC	X205 Dup. of X204	X206 Pettibone GLNTC	X207 Pettibone GLNTC	X208 Pettibone	X209 Pettibone	X210 Origin of Pettibone
Date	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94	4-26 94	4-26-94	4-26-94	4-26-94	4-26-94
VOLATILES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Vinyl Chloride	14 0 U	14 0 U	--	--	--	--	--	--	30 0	6700 D
Methylene Chloride	14 00 U	14 0 U	35 0 B	--	--	--	--	--	--	--
Acetone	23 0	12 0 J	26 0	16 0	24 0 J	7 0 J	46 0 J	5 0 J	5 0 J	--
Carbon Disulfide	4 0 J	14 0 U			4 0 J	4 0 J	4 0 J	--	--	--
1 1 - Dichloroethene	--	--	--	--	--	--	--	--	--	8 0 J
1,1 - Dichloroethane	--	--	--	--	--	--	--	--	--	12 0 J
1 2 - Dichloroethene (total)	14 0 U	14 0 U				--	34 0	25 0	25 0	7000 D
2 Butanone	13 0 J	5 0 J	20 0	7 0 J	6 0 J	--	31 0 J	--	--	--
1,1,1 - Trichloroethane	14 00 U	14 0 U	13 0	--	--	--	--	--	--	--
Trichloroethene	14 00 U	14 0 U	--	--	--	--	13 0 J	8 0 J	--	4 0 J
4 Methyl - 2 - Pentanone	14 00 U	14 0 U	--	--	--	--	3 0 J	--	--	--
Tetrachloroethene	14 00 U	14 0 U	-	--	--	--	21 0	--	--	--
1,1,2,2 - Tetrachloroethane	14 00 U	14 0 U	--	--	--	--	4 0 J	--	--	--
Toluene	14 00 U	14 0 U	4 0 J	--	--	--	12 0 J	--	--	--
Ethylbenzene	14 00 U	14 0 U	--	--	--	--	6 0 J	--	--	--
Styrene	14 00 U	14 0 U	--	--	--	--	3 0 J	--	--	--
Xylene (total)	14 00 U	14 0 U	6 0 J	--	--	--	33 0	--	--	--
SEMIVOLATILES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
4 - Methylphenol	450 00 U	440 0 U	--	--	--	--	820 0 J	--	--	--
Naphthalene	130 00 J	170 0 J	600 0	--	--	300 0 J	--	--	--	--
2 - Methylnaphthalene	110 00 J	160 0 J	310 0 J	--	--	120 0 J	--	--	93 0 J	--
Acenaphthylene	450 00 U	120 0 J	--	--	--	--	--	--	--	--
Acenaphthene	730 00	440 0 U	850 0	--	--	530 0	--	--	--	--
Dibenzofuran	510 00	130 0 J	600 0	--	--	330 0 J	--	--	--	--
Fluorene	680 00	220 0 J	980 0	--	--	--	--	--	--	--
Phenanthrene	45000 00 U	1100 0	5700 0	3100 0	3100 0	4800 0	5000 0	--	130 0 J	420 0
Anthracene	840 00	220 0 J	1200 0	--	--	670 0	--	--	--	--
Carbazole	950 00	220 0 J	1500 0	--	--	1200 0	--	--	--	--
Di - n - Butylphthalate	740 00	960 0	980 0 B	1100 0 J	1300 0 J	--	1100 0 J	--	--	--
Fluoranthene	3100 00	1600 0	2000 0	3000 0	3100 0	7200 0	6700 0	--	--	750 0
Pyrene	45000 00 U	1400 0	1100 0	2400 0	2800 0	6100 0	4600 0	--	--	730 0
Butylbenzylphthalate	420 00 J	440 0 U	--	--	--	--	--	--	--	--
Benzo(a)anthracene	2200 00	880 0	--	1700 0 J	--	3400 0	2700 0	--	--	410 0
Chrysene	2300 00	870 0	3800 0	--	--	3500 0 J	3300 0	--	--	490 0
bis(2 - Ethylhexyl)phthalate	300000 00	560 0	--	--	--	12000 0	22000 0	--	--	440 0
Di - n - Octylphthalate	23000 00 J	440 0 U	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	450 00 U	730 0	--	--	--	--	4300 0	--	--	--
Benzo(k)fluoranthene	2300 00	440 0 U	3500 0	--	--	--	2800 0	--	--	--
Benzo(a)pyrene	450 00 U	440 0 U	2500 0	--	--	2100 0	3200 0	--	--	--

NORTH CHICAGO REFINERS & SMELTERS
ILD097271563

SEDIMENT SAMPLES (cont)

SAMPLING POINT	X201 Trib. to Pettibone	X202 Trib. to Pettibone	X203 L. Michigan Harbor	X204 Pettibone GLNTC	X205 Dup. of X204	X206 Pettibone GLNTC	X207 Pettibone GLNTC	X208 Pettibone	X209 Pettibone	X210 Origin of Pettibone
Date	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94	4-26-94
PESTICIDES	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
alpha - BHC	2 30 U	1 2 J	5 5 P	--	--	6 0 P	--	--	--	--
delta - BHC	2 30 U	2 3 U	--	120 0 P	--	--	--	--	--	--
Heptachlor	1 30 J	2 3 U	--	--	--	--	--	--	--	--
Heptachlor epoxide	2 30 U	4 0 P	--	--	--	--	--	--	--	--
Endosulfan I	2 30 U	2 3 U	--	--	30 0	--	--	--	--	--
Dieldrin	4 80 P	9 8 P	12 0 P	36 0 JP	25 0 JP	64 0 PD	5 8 P	--	--	0 6 JP
4,4 - DDE	4 50 U	41 0	280 0 D	230 0 P	260 0 P	300 0 D	--	--	--	--
Endrin	33 00 P	9 7 P	82 0 PD	210 0 P	210 0 P	220 0 PD	53 0 P	0 4 JP	0 7 JP	6 0 P
Endosulfan II	12 00	4 4 U	--	--	--	--	17 0	--	--	--
4,4' - DDD	26 00 P	59 0	580 0 D	3300 0 D	3100 0 D	460 0 PD	53 0 P	--	--	5 7 P
4,4' - DDT	42 00	71 0	200 0 D	170 0	310 0	170 0 PD	69 0 P	0 5 JP	0 7 JP	--
Endrin aldehyde	4 50 U	4 4 U	--	96 0 P	--	--	--	0 2 JP	--	6 1 P
alpha - Chlordane	1 10 JP	29 0	19 0	84 0	--	16 0	12 0 P	--	--	2 4
gamma - Chlordane	2 30 U	16 0 P	21 0 P	36 0 P	30 0 P	--	8 5 P	--	--	1 7 JP
Aroclor - 1016	45 00 U	44 0 U	--	1300 0	1600 0	680 0 P	--	--	12 0 J	--
Aroclor - 1254	270 00	44 0 U	1200 0 PD	5200 0 PD	3300 0 P	1800 0 D	650 0	--	--	69 0
Aroclor - 1260	310 00	160 0	--	1400 0	1700 0	2800 0 D	460 0	10 0 J	11 0 JP	--
INORGANICS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	4320 00	3740 0	4180 0	11600 0	12400 0	4830 0	4450 0	12800 0	16000 0	10100 0
Antimony	14 70 UJ	10 8 UJ	--	15 5 J	--	--	--	--	--	--
Arsenic	5 90 J	6 1 J	8 8 J	22 1	24 0	7 4	7 4 J	17 5 J	7 1 J	8 5 J
Barium	54 90 B	55 2	31 6 B	208 0	167 0	48 8	50 4 B	104 0	68 6	96 1
Beryllium	0 46 B	0 3 B	0 8 B	2 4	3 0	0 6 B	0 7 B	1 2	1 3	0 9 B
Cadmium	1 20 U	0 8 U	0 9 B	4 7	5 6	0 9 B	2 3	1 5	--	--
Calcium	47800 00	65000 0	39700 0	88700 0	102000 0	53700 0	31800 0	85700 0	76000 0	83800 0
Chromium	9 70	13 0	12 3	61 6	69 2	21 6	20 8	42 2	25 3	17 0
Cobalt	7 10 B	6 9 B	6 0 B	18 1	15 4	5 0 B	4 1 B	13 5	11 5	8 1 B
Copper	38 20	16 9	15 9 0	465 0	475 0	209 0	425 0	2530 0	106 0	69 8
Iron	11600 00	16000 0	12000 0	19000 0	17300 0	15000 0	12100 0	36700 0	23700 0	19300 0
Lead	146 00	48 0	149 0	392 0	435 0	278 0	167 0	1840 0	46 9	48 2
Magnesium	23700 00	36400 0	20500 0	24600 0	29800 0	28700 0	15700 0	38500 0	39500 0	44300 0
Manganese	345 00	472 0	342 0	2140 0	2470 0	378 0	291 0	1110 0	541 0	616 0
Mercury	0 04 B	0 1 B	0 2	1 4	1 6	0 3	0 1 B	0 2	1 1	--
Nickel	9 20 B	10 4	24 9	216 0	445 0	22 9	19 4	107 0	36 1	26 1
Potassium	836 00 B	1060 0	885 0 B	3350 0	3290 0	1190 0	636 0 B	1680 0	4700 0	2880 0
Selenium	0 27 UJ	0 2 UJ	--	3 5 J	5 0 J	0 7 BJ	--	2 2 J	--	--
Silver	1 20 U	0 8 U	1 5 B	42 1	50 8	1 8 B	--	--	--	--
Sodium	292 00 B	227 0 B	463 0 B	765 0 B	748 0 B	273 0 B	548 0 B	5540 0	700 0 B	658 0 B
Thallium	0 27 U	0 2 U	--	--	0 4 BJ	--	--	0 2 B	0 5 B	0 3 B
Vanadium	15 00	13 8	14 2	25 6	26 9	15 1	12 5 B	22 4	29 7	21 2
Zinc	159 00	83 3	664 0	1160 0	605 0	685 0	1230 0	17000 0	614 0	820 0
Cyanide	1 20 U	1 0 U	--	3 9	4 2	2 4	--	--	--	--

TENTATIVELY IDENTIFIED COMPOUNDS

North Chicago Refiners & Smelters
ILD097271563

SOIL SAMPLES						
SAMPLE POINT	X102	X103	X104	X105	X108	X109
Benzenedicarboxylic acid	2000 BJN	2200 JN	1800 JN	2300 JN	N.D.	1600 J
Heptachlor Epoxide	N D	N D	N D	N D	490 JN	550 JN
Methyl Phenanthrene	N D	N D	N D.	840 JN	N D.	N D.

SEDIMENT SAMPLES						
SAMPLE POINT	X201	X203	X206	X207	X208	X209
Benzenedicarboxylic acid	290000 JN	N D	N D	N D.	1700 JN	2100 JN
Benzo(c)phenanthrene	N D	N D.	1400 JN	N D	N D.	N D
Dimethyldisulfide	N D	N D	N D	220 JN	N D.	N D.
Hydroxymethyl Pentanone	340000 JNBA	N D.	170000 JNBA	180000 JNBA	N D.	N D.
Methylanthracene	N D	2600 JN	N.D.	N D.	N D.	N.D.
Naphthacene	N D.	7000 JN	N.D.	N D	N.D.	N D.
Thiobis Methane	N D	N D	N D.	230 JN	N D.	N.D.

SEDIMENT SAMPLE DESCRIPTIONS

SAMPLE	DEPTH	APPEARANCE	APPROXIMATE LOCATION
X201	4" – 8" under 2" water	Black/brown; sandy to med. size gravel; leaf decay	GLNTC, northern trib. to Pettibone 138' downstream of steam line
X202	4" – 6" under 4" – 6" water	Black; sandy with leaf decay	GLNTC, southern trib. to Pettibone 274' upstream of hospital bridge
X203	6" – 16" under 2.5' water	Dark silty gravel with some sand	GLNTC, inner harbor; 160' E of bridge marked "1938" 52' N of southern concrete bank
X204/X205	16" – 18" under 18" water	Very black; sandy, silty with gravel; petroleum–like odor	GLNTC, Pettibone Crk. between harbor and southern trib. 42' S of gravel rd. and 183' W of bridge
X206	4" – 8" under 3" water	Black; sandy to lrg. rock texture; tar–like smell	GLNTC, Pettibone Crk. between the tributaries; 140' downstream of bunker 24 E
X207	0" – 6" under 1" water	Dark grey; silt/sand with leaf matter	GLNTC, Pettibone Crk. 12' downstream from culvert where creek enters GLNTC
X208	0" – 6" under 6" water	Grayish brown clay	Pettibone Crk. NW of Sheridan Rd. 15' downstream of outfall from east/north
X209	8" – 9" under 8" water	Hard gray clay	Pettibone Crk. NW of Sheridan Rd. 34' downstream from Federal Chicago fence.
X210	0" – 6" under 4" water	Dark gray/green; silty sandy clay	Origin of Pettibone Crk. 1' downstream of culvert from north 20' east of Commonwealth

NORTH CHICAGO REFINERS & SMELTERS
ILD097271563

SOIL SAMPLE DESCRIPTIONS

SAMPLE	DEPTH	APPEARANCE	APPROXIMATE LOCATION
X101	0" – 1"	Light brown silt loam	GLNTC, Lawn of housing unit 2845 42' S of south side of housing unit 2845 and 93' W of ???some street
X102	0" – 1"	Light brown silty loam with some gravel and clay, black lumps	GLNTC, Baseball field, lawn area north of Wyoming St 114' N of Wyoming St and 50' W of utility pole B280
X103	0" – 1"	Light brown silty loam	M P Hart School, 1110 18th Street East of building and south of playground 27' S of playground fence and 30 5' E of east side of school building
X104	0" – 1"	Dark brown silt loam with some sand	1923 Glenn, off SW corner of house; 18' S of southwest corner of house and 25' E of fence along Glenn
X105	0" – 1"	Dark brown humus with some clay	1924 Jackson Street, front lawn, east of house, 23' E of southeast corner of house and 15' S of home's walkway leading to front porch
X106	0" – 1"	Light brown silty loam	1018 Argonne Drive, front lawn, 12' S of southeast corner of home and 14'4" W of walk leading to front door
X107	0" – 1"	Dark brown silt loam with some sand	918 Argonne, front lawn, 16' S of home's southeast corner and 18 5' W of home's walk leading to front door
X108/X109	0" – 1"	Light brown silty loam	917 Argonne, back lawn; 15' W of residence's east wood fence and 19' S of south wall of house
X110	0" – 1"	Light brown silty loam	1830 Park Ave ; back lawn; 20' W of west side of house and 11'10" S of hurricane fence

I am in the process of identifying this street name! ⇒Bldg. 3460 off of Buckley Rd

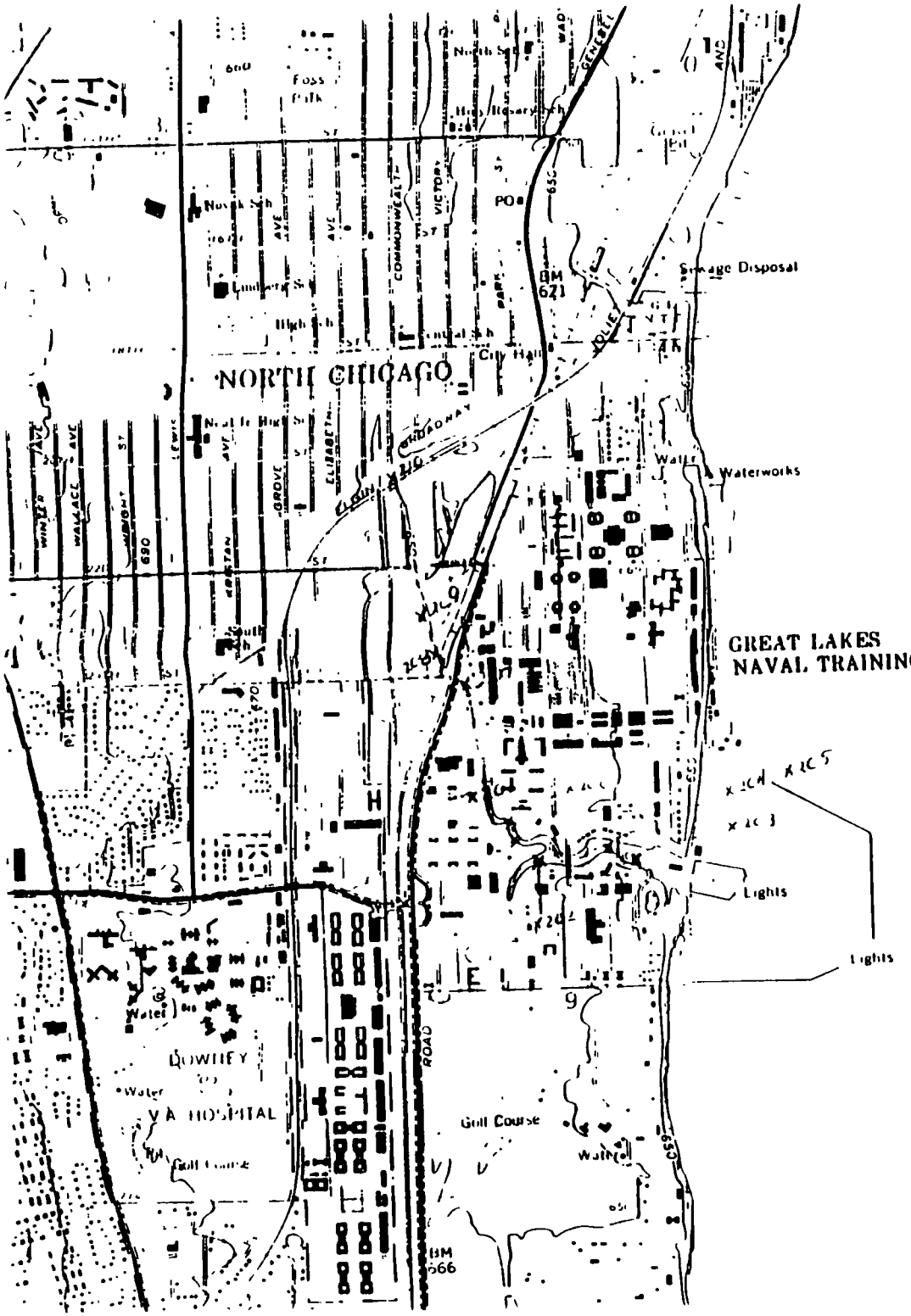
STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

IL 532-0357
ADM 39
054-002

Subject Permit limits
Data LaVin + Sons sediment
Reviewed by C Kallis Date 2-15-95

Sediment data From upstream and downstream OF NCRS combined discharg From storm sewer. All concentrations in Mg/kg

parameter	Upstream	downstream
Barium	68.6	104
Beryllium	1.3	11.2
Chromium	25.3	42.2
Copper	106	2530
Iron	23700	36700
Lead	46.9	1840
Manganese	541	1110
Nickel	36.1	107
Zinc	614	17000



Approximate Sample Locations (Pettibone Creek) collected during CERCLA Expanded Site Inspect. of NCR + S

4-26-94

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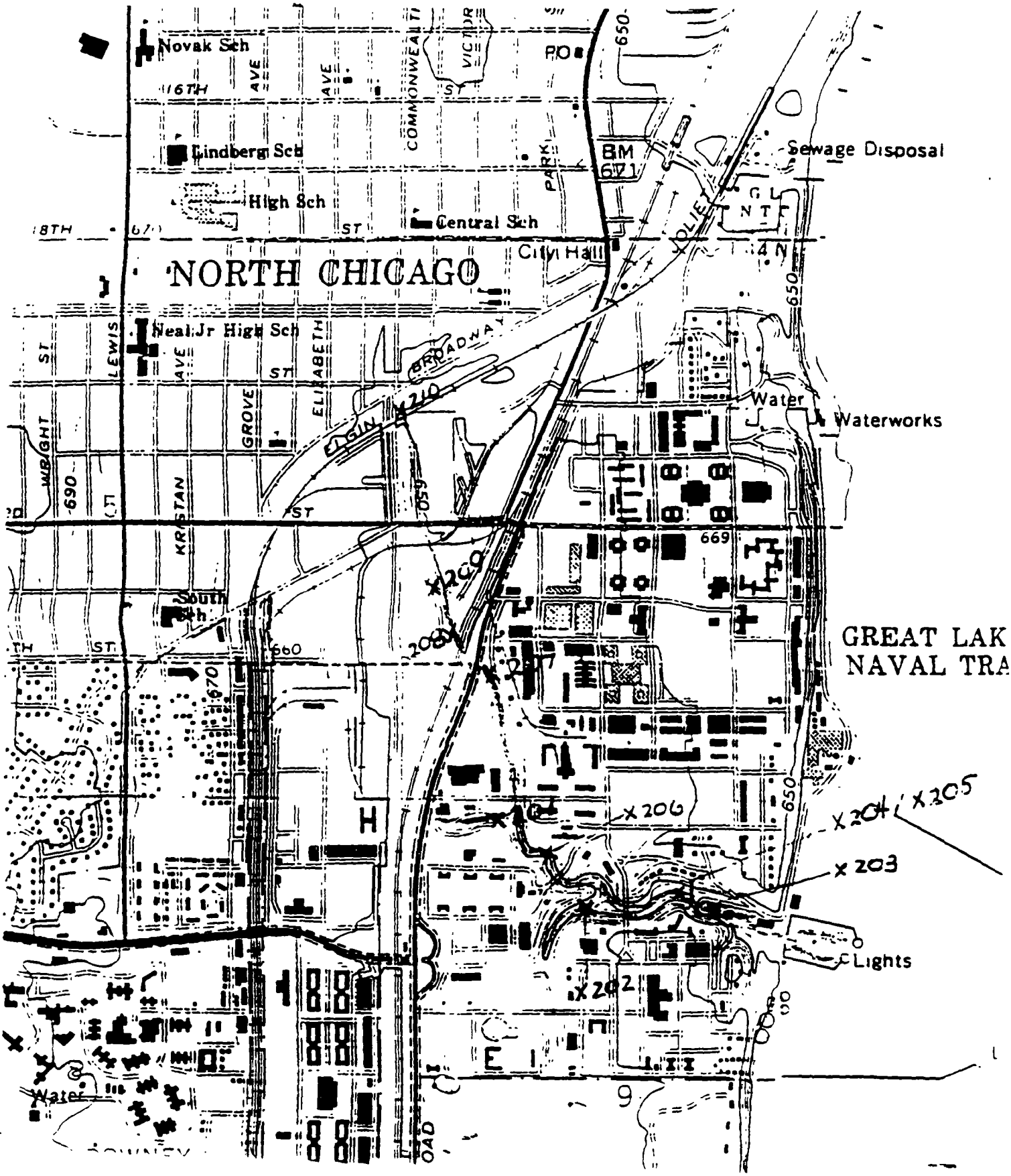
FEB 1 1995
DIV. OF POLLUTION CONTROL
Field Operations Section - Reg. 2

LAKE MICHIGAN

APPROXIMATE MEAN LAKE ELEVATION SEE


Novak Sch
16TH
AVE
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COMMONWEALTH
VICTOR
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PO
650
Lindberg Sch
BM
671
Sewage Disposal
PARK
High Sch
Central Sch
18TH
ST
City Hall
NORTH CHICAGO
JOLIET
650
Neal Jr High Sch
LEWIS
AVE
ST
BROADWAY
ELIZABETH
GROVE
ST
WRIGHT
690
KRISTAN
AVE
ELGIN
X210
Water
Waterworks
659
ST
669
X209
South
Sch
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GREAT LAK
NAVAL TRA
X206
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X204
X205
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Lights
X202
Water
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Field Operations Section – Reg. 2

TABLE 7

TOTAL INORGANICS FOR SHALLOW MONITORING WELL WATER SAMPLES
SUMMARY OF VALIDATED ANALYTICAL RESULTS
FOR THE FIRST AND SECOND ROUND SAMPLES (1)
NORTH CHICAGO REFINERS AND SMELTERS
NORTH CHICAGO, ILLINOIS

Sample Designation	NCMW1S1W	NCMW1S2W	NCMW2S1W	NCMW2S2W	NCMW2S2WB	NCMW3S1W
Remarks					Field Blank	
Sampling Round	First	Second	First	Second	Second	First
Sampling Date	11/91	1/92	11/91	1/92	1/92	11/91
Inorganics, ug/L						
Aluminum	12,600. J	NA	19,000.	NA	NA	47,000.
Antimony	37.6 U	8.7 U	19.1 U	23.5 U	9.	105.
Arsenic	13.1 J	5.3	10.1 J	16.2	-	18.4 J
Barium	179. J	166.	175.	151.	-	355.
Beryllium	UL	-	1.2	3. U	1.	14.
Cadmium	61.3 J	6.8 U	12. U	8.1 U	-	18.1
Calcium	156,000. J	NA	179,000.	NA	NA	154,000.
Chromium	1,190. J	199.	75.7	87.8	UL	273.
Cobalt	16.1 U	5.3 U	16.8 U	21.6	-	32.4 U
Copper	5,120. J	675.	355.	560.	6.7	14,200.
Iron	29,700. J	NA	41,500.	NA	NA	69,600.
Lead	1,630. J	250.	709.	863.	2.9 J	5,320. J
Magnesium	105,000. J	NA	88,300.	NA	NA	88,700.
Manganese	1,500. J	NA	1,080.	NA	NA	2,880.
Mercury	UL	-	-	-	-	-
Nickel	364. R	281.	87.7	92.9	-	306.
Potassium	59,900. J	NA	25,100.	NA	NA	31,100.
Selenium	(5x) R	UL	- R	20.4 J	UL	(5x) R
Silver	8.8 J	3.4 U	5.4	-	-	9.1
Sodium	1,460,000. J	NA	73,100.	NA	NA	459,000.
Thallium	(5x) UL	(5x) UL	UL	UL	UL	(5x) UL
Vanadium	27.4 J	6.7 U	39.2	47.4	-	76.4
Zinc	11,900. J	2,070.	5,240.	4,910.	12.	28,300.
Boron	34,800. J	33,100. J	3,430. J	7,960. J	- R	16,000. J
Cyanide	-	315.	-	UL	-	-
Tin	NA	66.2 U	NA	112. U	-	NA

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Note:

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TABLE 7

TOTAL INORGANICS FOR SHALLOW MONITORING WELL WATER SAMPLES
SUMMARY OF VALIDATED ANALYTICAL RESULTS
FOR THE FIRST AND SECOND ROUND SAMPLES (1)
NORTH CHICAGO REFINERS AND SMELTERS
NORTH CHICAGO, ILLINOIS

Sample Designation	NCMW3S2W	NCMW4S1W	NCMW4S2W	NCMW5S1W	NCMW5S2W
Remarks					
Sampling Round	Second	First	Second	First	Second
Sampling Date	1/92	11/91	1/92	11/91	1/92
Inorganics, ug/L					
Aluminum	NA	10,400.	NA	15,400.	NA
Antimony	30.4 U	-	-	-	-
Arsenic	15.4 J	3.3	2.3	8.2	10.1
Barium	655. J	85.5	202.	145.	786.
Beryllium	19.5 J	-	-	-	7. U
Cadmium	18. J	1.6 U	-	2.5 U	-
Calcium	NA	359,000.	NA	313,000.	NA
Chromium	362. J	42.5	118.	26.3	274.
Cobalt	81.6 J	14.2 U	54.2	17.7 U	129.
Copper	20,400. J	53.6 J	204.	148.	1,070.
Iron	NA	26,700.	NA	27,300.	NA
Lead	7,500. J	17.8	72.7 J	59.1	371. J
Magnesium	NA	160,000.	NA	13,300.	NA
Manganese	NA	2,010.	NA	2,390.	NA
Mercury	0.3 J	-	-	-	-
Nickel	482. J	79.7 R	155.	48.5 U	351.
Potassium	NA	9,800.	NA	7,380.	NA
Selenium	5.7 R	(5x) R	(5x) UL	(5x) R	UL
Silver	UL	8.9	-	5.3	-
Sodium	NA	140,000.	NA	110,000.	NA
Thallium	(5x) UL	UL	2. J	(5x) R	UL
Vanadium	189. J	23.1	103.	32.2	344.
Zinc	38,700. J	186.	592.	997.	5,310.
Boron	16,100. J	2,010. J	2,270. J	NA	5,750. J
Cyanide	UL	-	UL	-	UL
Tin	1,610. J	NA	90.7 U	NA	137.

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TOTAL INORGANICS FOR SHALLOW MONITORING WELL WATER SAMPLES
SUMMARY OF VALIDATED ANALYTICAL RESULTS
FOR THE FIRST AND SECOND ROUND SAMPLES (1)
NORTH CHICAGO REFINERS AND SMELTERS
NORTH CHICAGO, ILLINOIS

Sample Designation	NCMW6S1W	NCMW6S2W	NCMW7S1W	NCMW7S1WB	NCMW7S2W
Remarks				Field Blank	
Sampling Round	First	Second	First	First	Second
Sampling Date	11/91	1/92	11/91	11/91	1/92
Inorganics, ug/L					
Aluminum	6,670.	NA	16,800.	48.	NA
Antimony	-	UL	85.3 U	-	108. J
Arsenic	3.7 J	3.5 J	23.8	-	47.4 J
Barium	68.2	181. J	250.	-	696. J
Beryllium	-	1.5 U	3.9	-	9. U
Cadmium	1.3 U	UL	51.4	1.8	140. J
Calcium	146,000.	NA	142,000.	90.2	NA
Chromium	30.2	91.4 J	140.	-	256. J
Cobalt	7.3 U	37.9 J	15.1 U	3.	40.5 J
Copper	160.	631. J	6,530.	3.7	21,500. J
Iron	14,600.	NA	32,800.	38.7	NA
Lead	53.3	177. J	3,610.	2. J	13,500. J
Magnesium	69,100.	NA	56,600.	54.5	NA
Manganese	474.	NA	1,780.	UL	NA
Mercury	-	UL	-	-	0.49 J
Nickel	38.9 U	134. J	114.	-	320. J
Potassium	5,170.	NA	23,900.	-	NA
Selenium	7.7 J	10.5 R	(5x) R	- R	UL
Silver	5.4	UL	9.7	-	8. U
Sodium	159,000.	NA	201,000.	236. J	NA
Thallium	(5x) UL	UL	(5x) UL	UL	(5x) UL
Vanadium	14.9 U	82.2 J	33.4	-	101. J
Zinc	268.	918. J	30,100.	5.5	86,700. J
Boron	6,210. J	9,810. J	10,100. J	65.3 J	10,800. J
Cyanide	-	UL	NA	-	UL
Tin	NA	74.9 U	NA	NA	2,810. J

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TABLE 7

TOTAL INORGANICS FOR SHALLOW MONITORING WELL WATER SAMPLES
SUMMARY OF VALIDATED ANALYTICAL RESULTS
FOR THE FIRST AND SECOND ROUND SAMPLES (1)
NORTH CHICAGO REFINERS AND SMELTERS
NORTH CHICAGO, ILLINOIS

Sample Designation	NCMW7S2WD	NCMW8S1W	NCMW8S1WD	NCMW8S2W	NCMW8S2WB
Remarks	Duplicate		Duplicate		Field Blank
Sampling Round	Second	First	First	Second	Second
Sampling Date	1/92	11/91	11/91	1/92	1/92
Inorganics, ug/L					
Aluminum	NA	6,880. J	8,420. J	NA	NA
Antimony	76.5 J	179.	194.	462. J	-
Arsenic	56. J	43.6	49.2	120. J	-
Barium	1,040. J	322.	337.	2,300. J	-
Beryllium	15. J	-	1.	UL	-
Cadmium	220. J	85.6	70.	134. J	-
Calcium	NA	213,000.	200,000.	NA	NA
Chromium	896. J	18.4	22.9	150. J	UL
Cobalt	65.3 J	11.7 U	10.4 U	40.5 J	-
Copper	38,900. J	10,000. J	12,600. J	56,700. J	5.4
Iron	NA	46,800.	43,200.	NA	NA
Lead	20,100. J	8,920. J	6,610. J	18,200. J	5.4 J
Magnesium	NA	100,000.	96,400.	NA	NA
Manganese	NA	2,480.	2,210.	NA	NA
Mercury	0.6 J	-	-	2.6 J	-
Nickel	615. J	122.	120.	439. J	-
Potassium	NA	45,600.	44,700.	NA	NA
Selenium	12.7 J	(5x) R	(5x) R	UL	UL
Silver	23.2 J	6.4	5.8	17.6 J	-
Sodium	NA	456,000. J	444,000. J	NA	NA
Thallium	(5x) UL	(5x) R	(5x) R	(5x) UL	UL
Vanadium	151. J	13.8 U	15.3 U	86.8 J	-
Zinc	138,000. J	41,000.	39,100.	94,000. J	7.6
Boron	10,700. J	9,930. J	9,780. J	10,000. J	- R
Cyanide	UL	-	-	UL	-
Tin	4,320. J	NA	NA	7,680. J	-

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